

* Records of Revision *

Rev.	Page	Description of changes	Date	prepared by
0	All	Original Release	09.07.06	Tang Jiehua

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Model	BTL181216-175L	2/27	PRODUCT SPECIFICATION



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1. Features

The features of BTL181216-175L are as follows

- * Display mode : TFT 262K Colors, Transmissive, Normally White
- * Driving Condition : 128x3Ch-Source / 160Ch-Gate
- * Connection : Soldering Type
- * LCD Driver & Control IC : ST7735 (Sitronix)
- * Back Light : White LED Back Light (2 Chips in Parallel)
- * MPU Interface : Serial Peripheral Interface
- * Type of Surface Contion : Clear Type

2. Mechanical Specifications

Item		Specification	Unit	
Posolution	Main 128(x RGB) x 160		Dot	
Resolution	Sub	NA		
LCM Outline Deme	nsion	34.70x46.70x2.60 (Typ)	mm	
	Main	28.03 x 35.04		
Active Area (W × H)	Sub	NA	mm	
Divel Diteb (M(y H)	Main	0.219 x 0.219		
	Sub	NA		
Viewing Direction	Main	6	Olalaak	
(Human Eye)	Sub	NA	U CIUCK	
Gray Scale Inversion	Main	12	O'clock	
(Contrast Ratio)	Sub	NA	Direction)	
Weight		About 8	g	

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3. Absolute Maximum Ratings

				(1	a=25℃ Note1)
Items	Symbol	Min.	Max.	Unit	Remark
Logic voltage	I _{ovcc}	-0.3	4.6	V	
Analoge voltage	V _{CI}	-0.3	4.6	V	
Input signal voltage	V _{IN}	0.3	lovcc+0.3	V	
LED forward current	I _{LED}	-	25	mA	For each LED
Operation temeprature	T _{OPR}	-20	70	Ĵ	
Storage temperature	T _{STG}	-30	80	Ĵ	
Humidity (ambient		Ta≤60 ℃	90% F	RH Max.	

Note1 : Device is subject to be damaged permanently,

if stresses beyond those absolute maximum ratings listed above.

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4. Electrical Characteristics

Main							Ta=25 ℃
Items		Symbol	Min.	Тур.	Max.	Unit	Remark
Logic voltage		I _{OVDD}	1.65	1.9	3.3	V	
Anolog(Power) voltage		V_{dd}	2.6	2.75	3.3	V	
Gate voltage	High level	V _{GH}	10	-	16	V	Note 1
	Low level	V _{GL}	-16	-	-9	V	
Input signal	High level	V _{IH}	0.7lovdd	-	Iovdd	V	
voltage	Low level	V _{IL}	Vss	-	0.3lovdd	V	
current consumption		lcc	-	3.0	4.5	mA	Note 2

Note 1) The value can be adjusted by software to optimize display quality Note 2) Display Black Pattern

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5. Recommended Software Setting Value (LDI: ST7735)

Initial Code

INDEX	DATA	INDEX	DATA
Powe	r on		0X17
10ms dela	ay or more		0X15
Hardwar	e Reset		0X1E
Waiting	120ms		0X2B
R11	-		0X04
RFF	0X40		0X05
	0X01		0X02
	0X1A		0X0E
RB1	0X00	Gamma	a Setting 2
	0X06	RE1	0X0B
	0X03		0X14
RB2	0X00		0X08
1102	0X06		0X1F
	0X03		0X22
RB3	000		0X1D
1100	0X06		0X18
	0X03		0X10
	0×00		
	0700		0×14
	0703		0X1A
	0×03		0724
	0×15		0X26
KD0	0×15		0X06
	0X02		0700
RC0	0X02		0X02
	0X70		0X0F
RC1	0X05	Setup the	Display Area
RC2	0X01	R2A	0X00
	0X02		0X00
RC3	0X02		0X00
	0X07		0X7F
RC4	0X01	R2B	0X00
	0X02		0X00
RFC	0X11		0X00
	0X15		0X9F
RC5	0X50	Display	-On Mode
	0X38	R29	-
R36	0XC0	Waitin	ig 120ms
R3A	0X05		
Gamma S	etting 1	Write Di	splay Data
RE0	0X09	R2C	Display Data
	0X16		
	0X09		
	0X20		
	0X21		
	0X1B		
	0X13		
	0X19		

Sleep In

-				
INDEX	DATA			
R10	-			
Waiting 120ms				

Sleep Out

-				
INDEX	DATA			
R11	-			
Waiting 120ms				

Windows Display Setting

INDEX	DATA
R2A	StartX
	StartX
	EndX
	EndX
R2B	StartY
	StartY
	EndY
	EndY

Display On/ Off Code

NDEX	DATA				
Dis	olay On				
R29 -					
Waiting 120ms					
Dis	Display Off				
R28 -					
Waiting 120ms					

Note:

R3A=0X05, 65K Colors R3A=0X06, 262K Colors

NOTE: BOE requires the customer to follow the above instructions strictly. If customer would like to change the above instructions, the customer should inform BOE and get re-check from BOE, or the customer will be responsible for any unexpected result because of the change.

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6. Back Light System Characteristics

					Ta=25℃		
Items	Symbol	Min.	Тур.	Max.	Unit	Remark	
Forward current	lf	-	18	20	mA	Note1	
Forward voltage	Vf	3.0	-	3.4	V	Note1	
B/L Power consumption	P _{BL}	-	-	136	mW	Note2	

Note 1: The Driving conditon is defined for each LED chip.

Note 2: The B/L Power consumption is defined for the backlight module.the schematic drawing of the backlight module as the figure.



Ref. Total power consumpation(max) depends on LED current/ LED driver efficiency, etc.

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7. Optical Characteristics

Transmissive Mode

								Та	a =25℃
[1	tem	S	/mbol	Min.	Тур.	Max.	Unit	Condition	Note
			Ø=0° (X1)	-	45	-		Cr > 10	
Viewi	na Analo	Δ	Ø=180° (X2)	-	45	-	1		Note2
VIEWI		0	Ø=90° (Y1)	-	15	-	deg.		NOICE
			Ø=270° (Y2)	-	35	-			
Contr (trans	rast ratio missive)		Cr	140	270	-	-	$ \begin{array}{l} \theta = \ 0 \\ \emptyset = \ 0 \end{array} $	Note1 Note4
Respo	onse Time	٦	r + Tf	-	25	-	ms	$ \begin{array}{l} \theta = \ 0 \\ \emptyset = \ 0 \end{array} $	Note3
CIE	R		(x,y)	0.58,0.29	0.62,0.33	0.66,0.37			
Coordi	G		(x,y)	0.28,0.55	0.32,0.59	0.36,0.63		$\theta = 0$	
- nate	В		(x,y)	0.11,0.03	0.15,0.07	0.19,0.11		Ø = 0	
	W		(x,y)	0.25,0.25	0.29,0.29	0.33,0.33			
Brig	htness		L	160	210	-	cd/m2	18mA/LED	Note5
Unit	formity			70	-	-		18mA/LED	Note6

* Ø = 0 $^{\circ}$, Ø = 90 $^{\circ}$,Ø = 180 $^{\circ}$,Ø = 270 $^{\circ}$ means viewing direction.

* B/L is turned on.

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The optical characteristics should be measured in dark room, and after 5 minutes operation, the measurment begin.

Note1. Definition of Measure System





Note3. Definition of Response Time



Note 5. Measuring Point(9 Points) (WxH)



Rating is defined as the average brightness inside the viewing area

Note4.definition of contrast ratio



Note 6. definition of Uniformity

Uniformity= <u>max. Liuminance of measurede point</u> max. Liuminance of measurede poin

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9. Interface Pin Assignment

No	Symbol	Description
1	GND	Ground
2	GND	Ground
3	ID	10kΩ pull down resistor
4	VSS	Ground
5	VDD	Power Supply 2.8V
6	RSTB	Hardware Reset Signal(low active)
7	RS	RS Signal (RS=0:Index, RS=1:Data)
8	SCL	Serial clock
9	SDI	Serial data input/output PIN(DB0)
10	/CS	Chip Select Signal(low active)
11	GND	Ground
12	VDD	Power Supply 2.8V
13	LEDA	LED Anode(+)
14	LEDK1	LED Cathode(-)
15	LEDK2	LED Cathode(-)
16	GND	Ground



10. Power Supply Sequence

The power on/off sequence is illustrated below



VDD must be powered on before the VDDI.

VDDI must be powered off before the VDD.

During power off, if LCD is in the Sleep Out mode, VDD and VDDI must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VDD can be powered down minimum 0msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

- Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.
- Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

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11. Read/Write Timing characteristics (Series MPU)

Serial interface characteristics (4-line serial)











⑦ 京东方 BOE			
13.COLOR L	CD MODULE NUMBERING	SYSTEM	
B T L (1) (2) (1 8 1 2 1 6 3) (4) (5)	(6) 1 7	5 L (9) (10)
(1) B: BHL			
(2) Drive Sys C : CSTN	tem T:TFT E:OLED M:MON	D	
(3) Product S L: LCD N	Status Iodel F: FOG Model G: COG M	odel P: PANEL	Model C: CELL Model
(4) Display s EX) 2.22 i 1.9 in	ize(精确到小数点后1位,四舍五入) nch:22	0 10.1inch:A1 15.5inch:F5	
(5) Resolutio Number o EX) 128 * 7 176 * 2	on of Row Dots * Number of column D 128 = 1212 96 * 64 = 9664 128 * 220 =1722 128 * 96 = 1296 320 *	ots(前两位有效) 160 = 1216 101 * 240 =3224 102	* 80 = 1080 4*576 =1057
(6) Viewing I Nil: 6 H	Direction U: 12 H L: 9 H R: 3 H W: Wide	ə view E: 其他	
(7) Serial Nu 时省略不⁵	mber (*001-9999: 按照产品状态,谷 写)	各类产品序列号实行	f大排行处理, *为 0
(8) Back Ligi Nil:Withou T:Without F:CCFL Fr L:LED + Tr (9)DUAL LCI Nil: Single	ht ut backlight + Reflective backlight + Transflective rontlight + Reflective ransmissive D E LCD M:MONO C:CSTN T:T	H:CCFL + Transle E:LED Frontlight D:LED + Transfle FT O:OLED	ctive + Reflective ctive
Nil:Withou	It TP P:with TP		
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15. LCD Module Out-Going Quality Level

(1.0) Purpose

The LCD specification provides outgoing provision and its expected quality level based on our outgoing inspection of LCD.

(2.0) Applicable Scope

The LCD specification is applicable to the arrangement in regard to outgoing Inspection and quality assurance after it.

(3.0) Quality Specification

(3.1) Quality Level

The quality level of BHL&BMDT are based on GB/T2828.1, Apply Level II, normal inspection by single sampling.

Rank	Item	AQL	Note
Major(MA)	Segment Short	0.65	
	Segment Missing		
	Solder Bridging		
	Outside Dimension		
	Cold Solder		
Minor (MI)	Black Spots, Foreign Substance,	1.0	
	White Spots, Pinhole, Segment Deformation		
	Air Bubbles between Glass & Polarizer,		
	Scratchs(Glass & Polarizer),		
	Color Variation, Solder Ball,		
	Misalignment		

Note) AQL- Acceptable Quality Level

(3.2) Appearance Standards

1) Inspection Conditions

The LCD shall be inspected under 20W white fluorescent lamp light.

The distance between the eyes and the sample shall be 30cm.

All directions for inspecting the sample should be within 30° to perpendicular line.

2) Definition of the Area



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(3.3) Apperance Spec

0	Item	Criteria			Rank	Remark		
	Segment Short Segment Missing	Not allowed					MA	
	Solder Bridging	Any bridging	Any bridging between components,				MA	
		except comm	except common circuit, is not allowed.					
5	Outside Dimension	Drawing & s	pecificatio	n must be wi	thin		MA	
		permitable to	olerance.					
1	Cold Solder	Cold solder i	s not allow	ved.			MA	
5	Black(White)	1) Round Ty	pe				MI	
	Spots, Foreign							Y
	Substances	Ar	ea	Accepta	ble Q'ty	Remark		↔
		Dimen	sion**	A Area	B Area			$\bigcap \uparrow_{x}$
		≤ 0).1	Igr	ore			
		≤ 0).2	2	Ignore			
		≤ 0).3	1	Ignore			** : Mear
		0.3 <		0	Ignore			Diameter
		2) I in an Tam	_					(X + Y)/2
		2) Liner Typ	e	Assert	hla Oltra	Domort		
		Longth	Width	Accepta	Die Q ty	Kelliark		
		Length	widui	A Alea	D Alea			
			< 0.025	101	1/11/2			
		-	≤ 0.025	lgr	Ignore			
		- ≤ 2.5 ≤ 1.5	≤ 0.025 ≤ 0.05 ≤ 0.075	3 2	Ignore			
		$\frac{-}{\leq 2.5}$ ≤ 1.5 At (1) & (2)	$ \frac{\leq 0.025}{\leq 0.05} \\ \frac{\leq 0.075}{0.075 <} $ 2) total def	$\frac{1 \text{gr}}{3}$ $\frac{2}{\text{Follow r}}$ $\frac{2}{\text{Follow r}}$	Ignore Ignore ound type	•		
5	OC Spot	$\frac{-}{\leq 2.5}$ ≤ 1.5 At (1) & (2) exceed 5 p	$ \frac{\leq 0.025}{\leq 0.05} \\ \frac{\leq 0.075}{0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.075 < 0.0$	3 2 Follow r	Ignore Ignore ound type ist not		MI	
5	OC Spot	$\frac{-}{\leq 2.5}$ ≤ 1.5 At (1) & (2) exceed 5 p	$ \leq 0.025 \leq 0.05 \leq 0.075 0.075 < $ 2) total defieces.	3 2 Follow r èect q'ty is mu	Ignore Ignore ound type ist not	Remark	MI	
5	OC Spot	$ \frac{-}{\leq 2.5} \\ \leq 1.5 $ At (1) & (2) exceed 5 p Aro	$ \leq 0.025 \\ \leq 0.05 \\ \leq 0.075 \\ 0.075 < \\ 2) \text{ total defineces.} $	3 2 Follow r èect q'ty is mu Accepta A Area	Ignore Ignore ound type ist not ible Q'ty B Area	Remark	MI	
5	OC Spot	$\frac{-}{\leq 2.5}$ ≤ 1.5 At (1) & (2) exceed 5 p Ar Dimen ≤ 0	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total definites. ea sion** 0.2	3 2 Follow r eet q'ty is mu Accepta A Area Igr	Ignore Ignore ound type ist not ible Q'ty B Area	Remark	MI	
5	OC Spot	$-$ ≤ 2.5 ≤ 1.5 $At (1) \& (2)$ $exceed 5 p$ Are Dimen ≤ 0 ≤ 0	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total definites ea sion** 0.2 0.8	Ign 3 2 Follow r Vect q'ty is mu Accepta A Area Ign 3	Ignore Ignore ound type ist not ist not ble Q'ty B Area iore Ignore	Remark	MI	
5	OC Spot	$ \begin{array}{r} -\\ \leq 2.5\\ \leq 1.5\\ \end{array} $ At (1) & (2) exceed 5 p $ \begin{array}{r} \text{Are}\\ \text{Dimen}\\ \leqslant 0\\ \leqslant 0\\ \leqslant 0\\ \leqslant 1\end{array} $	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total definites ea sion** 0.2 0.8 .0	Ign 3 2 Follow r Pect q'ty is mu Accepta A Area Ign 3 1	Ignore Ignore ound type ist not ist not ble Q'ty B Area iore Ignore Ignore	Remark	MI	
	OC Spot	$\begin{array}{c} - \\ \leq 2.5 \\ \leq 1.5 \\ \end{array}$ At (1) & (2 \\ exceed 5 p \\ \hline \\ Dimen \\ \leq 0 \\ \leq 0 \\ \leq 1 \\ \end{array}	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defines. ea sion** 0.2 0.8 .0	Ign 3 2 Follow r Peet q'ty is mu Accepta A Area Ign 3 1	Ignore Ignore ound type ist not ible Q'ty B Area iore Ignore Ignore	Remark	MI	
5	OC Spot Air Bubles	$ \begin{array}{r} -\\ \leq 2.5\\ \leq 1.5\\ \end{array} $ At (1) & (2) exceed 5 p $ \begin{array}{r} \text{Are} \\ \text{Dimen} \\ \leq 0\\ \leq 1\\ \end{array} $	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defineces. ea sion** 0.2 0.8 .0	Ign 3 2 Follow r Sect q'ty is mu Accepta A Area Ign 3 1	Ignore Ignore ound type ist not ist not ble Q'ty B Area iore Ignore Ignore	Remark	MI	
5	OC Spot Air Bubles Between Glass &	$-$ ≤ 2.5 ≤ 1.5 $At (1) \& (2)$ $exceed 5 p$ Are Dimen ≤ 0 ≤ 1 Are	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defineces. ea sion** 0.2 0.8 .0 ea	Ign 3 2 Follow r ect q'ty is mu Accepta A Area Ign 3 1 Accepta	Ignore Ignore ound type ist not ible Q'ty B Area iore Ignore Ignore	Remark	MI	
5	OC Spot Air Bubles Between Glass & Polarizer	$-$ ≤ 2.5 ≤ 1.5 ≤ 1.5 At (1) & (2) exceed 5 p Are Dimen ≤ 0 ≤ 0 ≤ 1 Are	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defines ea sion** 0.2 0.8 .0 ea sion**	Ign 3 2 Follow r Vect q'ty is mu Accepta A Area Ign 3 1 Accepta A Area A Area A Area	Ignore Ignore ound type ist not ible Q'ty B Area ore Ignore Ignore ible Q'ty B Area	Remark	MI	
5	OC Spot Air Bubles Between Glass & Polarizer (Polarizer Defects)	$-$ ≤ 2.5 ≤ 1.5 ≤ 1.5 At (1) & (2) exceed 5 p Are Dimen ≤ 0 ≤ 0 ≤ 1 Are Dimen ≤ 0	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defines ea sion** 0.2 0.8 .0 ea sion** 0.15 2	Accepta A Area Igr Accepta A Area Igr Accepta Igr	Ignore Ignore ound type ist not ist not B Area iore Ignore Ignore Ignore ible Q'ty B Area iore	Remark	MI	
5	OC Spot Air Bubles Between Glass & Polarizer (Polarizer Defects)	$ \begin{array}{c} -\\ \leq 2.5\\ \leq 1.5\\ \end{array} $ At (1) & (2) exceed 5 p $ \begin{array}{c} \text{Are}\\ \text{Dimen}\\ \leq 0\\ \leq 1\\ \end{array} $ Are $ \begin{array}{c} \text{Are}\\ 0\\ \leq 0\\ $	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defineces. ea sion** 0.2 0.8 .0 ea sion** 0.15 0.3 0.5 0.02 0.075 < 0.075 < 0.08 0.05 0.	Accepta A Area Igr Accepta A Area Igr A Area Igr A Area	Ignore Ignore ound type ound type ist not ible Q'ty B Area iore Ignore B Area iore	Remark	MI	
5	OC Spot Air Bubles Between Glass & Polarizer (Polarizer Defects)	$ \begin{array}{c} $	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total defineces. ea sion** 0.2 0.8 .0 ea sion** 0.15 0.3 0.5 0.7	Ign 3 2 Follow r Sect q'ty is mu Accepta A Area Ign 3 1 Accepta A Area Ign 3 1 Accepta 3 1 3 2 1	Ignore Ignore Jgnore ound type ist not ist not B Area iore Ignore Ignore ible Q'ty B Area iore Ignore Ignore	Remark	MI	
5	OC Spot Air Bubles Between Glass & Polarizer (Polarizer Defects)	$-$ ≤ 2.5 ≤ 1.5 ≤ 1.5 $At (1) & (2)$ $exceed 5 p$ Are Dimen ≤ 0	≤ 0.025 ≤ 0.05 ≤ 0.075 0.075 < 2) total definites ea sion** 0.2 0.8 0.0 ea sion** 0.15 0.3 0.7 total 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 0.7 15 15 15 15 15 15 15 15 15 15	Ign 3 2 Follow r Pect q'ty is mu Accepta A Area Ign 3 1 Accepta A Area Ign 3 1 A Area Ign 3 2 1 5	Ignore Ignore Jgnore ound type ist not ist not B Area iore Ignore Ignore Ignore Ignore Ignore Ignore Ignore	Remark	MI	



(3.3) Appearance Spec

Pin hole	Chitelia	Tturini	
	$(X+Y)/2 \le 0.2 \text{mm}$	MI	
(On Segment)	Y Within 1 per one		
	segment (Less than 0.1mm		
	is not counted)		
	Total defects q'ty is must not exceed 5 pieces.		
Segment		MI	(X + Y)/2
Deformation			≤ 0.2 mm
	$(X+Y)/2 \le 0.2$ mm		
	$Y \uparrow \Box \qquad A \leq 0.2 \text{ mm}$		
	$B \le 0.2 \mathrm{mm}$		
	$(C-D) \leq 0.2$ mm		
	$\leftarrow C \rightarrow \downarrow \leftarrow D \rightarrow \uparrow B$		
	Acceptable Q'ty		
	Dot, Segment 1		
	LCD 5		
	$ \ge 0.1 $ Ignore all defect		
	Each visible dot must be more than hall		
Color Variation	Within the three colors, except I CD	MI	-
	Standard color is acceptable	1011	
Glass & Polarizer	Follow NO.5(2) condition	MI	
Scratch			
Solder Ball	1)Acceptable if the size of void is less	MI	
	than 0.18 mm		
	2)Acceptable if a solder ball is not movable		
	3)Rejectable if the solder ball exceed		
Mine Alienseed	$5EA \text{ in } 2.54 \times 2.54 \text{ mm}$ area.		-
Miss Alignment	1) Acceptable II it dose not exceed 50% of		
	$\frac{1}{2}$ $\frac{1}$		
	$PAD \downarrow X \ge W/2$. Accept		
	W \downarrow $\Lambda > W/2$. Reject		
	2)Rejectable provided that it does		
	exceed 50% of the component		
	termination width.		
	W1		
	W1 > W2 : Reject		
	Segment Deformation Color Variation Glass & Polarizer Scratch Solder Ball Miss Alignment	Segment DeformationXis not counted) Total defects q'ty is must not exceed 5 pieces.Segment Deformation x x x y y x x x y y x x x x x x x x x y y x <td>Segment DeformationMI$X$$X$$X \le 0.2 \text{ mm}$ $A \le 0.2 \text{ mm}$ $B \le 0.2 \text{ mm}$ $B \le 0.2 \text{ mm}$ $C-D) \le 0.2 \text{ mm}$ $C-D) \le 0.2 \text{ mm}$ $C-D) \le 0.2 \text{ mm}$<b< td=""></b<></br></br></br></br></br></br></td>	Segment DeformationMI X X $X \le 0.2 \text{ mm}$ $A \le 0.2 \text{ mm}$ $B \le 0.2 \text{ mm}$ $B \le 0.2 \text{ mm}$ $C-D) \le 0.2 \text{ mm}$

Note : A limitation sample is given top priority



(3.3) Appearance Spec

No Item		Criter	ia		Rank	Remark
4 Touch Panel	1) Round Type, Foreign Substances				MI	
						Y
	Area	Accepta	ble Q'ty	Remark		
	Dimension**	A Area	B Area			$() \uparrow_{x}$
	≤ 0.1	Ign	ore			
	≤ 0.2	2	Ignore			
	≤ 0.3	1	Ignore			** : Mean
	0.3 <	0	Ignore			Diameter
						(X + Y)/2
	2) Liner Type & Scra	tch				
			11.0%			
	Dimension	Accepta	ble Q'ty	Remark		
	Length Width	A Area	B Area			
	- W≤0.02	5 Igno	ore	4		
	$L \leq 3.0$ $W \leq 0.02$	5 Igno	ore	- ₋		
	$3.0 < L \leq 5.0$			Ignore		
	<u> </u>	. I	1	-		
	- W>0.1	Follow ro	ound type			
	3) Newton Ring a)Regular The area of the Newto It's NG. The area of the Newto It's OK. b)None-regularity The area of the Newto It's NG. The area of the Newto It's NG.	on ring is more t on ring is more t on ring is more t on ring is less that	han 1/3area an 1/3 area c han 1/2area an 1/2 area c	of the touch panel of the touch panel of the touch panel		
	1					
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(4.0) Reliability Condition

Item	Content
Room Temperature Operation	50,000 hrs

(4.1) Reliability Test - Module Middle Reliability

No.	Item	Condition	Test	Sample	Creteria	Note
			Time	Numbers	(Acc/Rej)	
1	High Temp Operation	70 ± 2℃	120 hrs	3	0/1	
2	Low Temp Operation	-20 ± 2 ℃	120 hrs	3	0/1	
3	High Humidity Storage	60℃ 90%rh	120 hrs	3	0/1	
4	Thermal Shock	30mn stage -20℃ ↔70℃	100 cycles /6days	3	0/1	

(4.2) Criteria

a. No changes for indication and appearance.

b. Leave the all samples under roon temperature 4 hours after reliability test ends.

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16. BHL&BMDT Customer Quality Service Process

In order to provide better service to Customer, BHL&BMDT shall apply the after-sales product quality service process as below:

- 1. According to the P/O from Customer, BHL&BMDT should deliver required product to the place appointed by Customer.
- 2. Customer will do IQC for the incoming product.
- 3. Inspection standard should be provided by BHL&BMDT, and it will be valid after confirmed by Customer.Inspection and Defects determination should be carried out according to the standard agreed by both Parties.
- 4. In order to guarantee in-time communication of product quality information and effective service, QA staff on Customer side should send Weekly Quality Report to the appointed CS staff in BHL&BMDT.
- 5. After BHL&BMDT get related information, both sides should arrange time and place to determin the defects found by Customer.
- 6. BHL&BMDT should cooperate with Customer for special quality requirement.
- 7. After confirmed by both side, BHL&BMDT should be responsible for the defect products which caused by its quality problem. BHL&BMDT should take back the confirmed defect product and return the good product to the place required by customer.
- 8. BHL&BMDT agree to provide related training of LCD product technology and usage.
- 9. Customer should use the LCD product according to the instruction. BHL&BMDT will not be responsible for the defect product caused by violation of Users' Instruction.
- 10. Both parties should deal with the quality problem with friendly cooperative policy. And both parties should negotiate to deal with the defect products of which the responsibility is not very clear.

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17. LCD Module Operation Instruction

BHL&BMDT

Part I. How to use the LCD Module

- 1. Don't hit the LCD Panel in any way because the LCD is made of glass.
- 2. Don't clean the surface of LCD with hard things. Please clean LCD with Air-gun or very soft cloth when necessary. The protective film on the POL can be removed just before assembly, otherwise, dust, spit or other foreign matter may attached on the LCD under the protective film. After the protective film is removed, only air-gun can be used to remove any dust or foreign matter. Fingure or cloth MUST NOT be used in such cases.
- 3. No chemical liquid is allowed to clean the LCD, such as alcohol, acetone and IPA. All of these can damage the LCD. Water on the LCD must be cleaned as soon as possible, for it will cause POL color change or other defect.
- 4. Please move and assemble LCD very carefully during assembly, and don't push or twist it.
- 5. Don't damage the FPC of LCD module. It will cause permanent defect.
- 6. Don't disassemble LCD module. It will cause permanent defect.
- 7. Don't expose LCD module under sunshine, strong fluorescence or ultraviolet radiation.
- 8. Please make sure that operators wear static-protective bands effectively and working tables are effectively earthing during operation.
- 9. Please place LCD module on the tray provided by BHL&BMDT while moving it, in order to avoid mechanical damage. Hold the module's side frames to avoide damage during moving.
- 10. Don't twist, disassemble, squeeze or hit the PCB. It will damage the circuit or component on PCB and cause functional defect.
- 11. Please use the connector according to the instruction provided by BHL&BMDT.
- 12. Please place dual module with the sub-panel upward. Trays should be placed in contrary direction. An empty tray should be placed on the top.
- 13. Sealing operation on PCB must be very careful to avoid short or cut the original circuit on PCB. Otherwise, it will cause permenant damage to the LCD.
- 14. Don't add direct DC or high voltage to LCD panel. It will cause functional damage to the LCD or shorten the life of LCD product.
- 15. LCD may respond slowly or display abnormally in extrem temperature (lower than -20℃ or higher than 50℃). But this doesn't mean LCD functional defect. LCD will display normally in regular temperature. Therefore, don't use LCD product in extrem temperature.
- 16. Don't push the display area of LCD panel, it will cause abnormal display. This doesn't mean LCD functional defect, neither. LCD will display normally in regular temperature.
- 17. Electrical test of LCD product is made by using mobile phone provided by Customer. We can use special test equipment to do the test, also.
- 18. The black band on IC on LCD product is used to protect the IC from light. Please do NOT remove it.
- 19. Please take great care to use connector. Customer should be responsible for connector defect caused by operation on Customer side.

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Part II Storage

- 1. Physical status of liquid crystal will change in extrem temperature, and it can not be resumed when the temperature returns to be normal. So LCD module should be stored in required temperature.
- 2. LCD module should be stored in required humidity. Low hymidity may add static, while high humidity may corrode the ITO circuit of LCD product. The suitable storage environment is: temperature: 22±5°C, humidity: 55%±10%.
- 3. Don't expose LCD module under sunshine, strong fluorescence or ultraviolet radiation for a long time. It should be stored in dark area.
- 4. LCD should be stored in static-protective polythene bag. Don't expose it in the air for a long time.